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EXAMINER

JAWORSKI, FRANCIS J

ART UNIT	PAPER NUMBER
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3737

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13

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/091,952

Applicant(s)

JAGO ET AL.

Examiner.

Jaworski Francis J.

Art Unit

3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7.9.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

The specification is objected to for ascribing a meaning for 'de-multiplexer' which is 'repugnant to the usual meaning of the term'. See MPEP 608.01(o). This terminology pertains to the undoing of multiplexing, i.e. the serial-to-parallel separation routing of signals which have been previously been time-multiplex combined. In the case of applicants' Fig. 6, the digitizer 80 has plural outputs but they do not represent such a routing but rather the paralleled bits associated with digitization levels of a given analog input, hence a serial data stream results in a serial digitized stream out. In Fig. 7, the six A/D converters are described as operating at a divided-down-by-4 clock interval from counter 78 to accept respective outputs 1-6 (Fig. 11) and then individually act identical to de-multiplexer 80 per spec page 9 bottom. [Asidem: specification page 9 lines 20-21 suggests that an S/H bank be shown on the output of 64']. Fig. 8 is presented to be operable with 'the TDDMs 64 of Figs. 5,6 and 7' [In fig. 3 TDDM 64 is shown; Figs. 5-7 bear different numbering or do not show such.] meaning that in the case of Figs. 6-7 the conflicting terminology carries forward..

A re-statement of the Examiner's concern may be made in terms of possible reconciling interpretations: It is possible that applicants are intending that A/D converter 80 has a dynamic range spanning M-times the bit numbers needed for a given ultrasound signal digitization and therefore can in fact provide parallel outputs with auxiliary circuit elements not shown. Or it is possible that the above statement regarding TDDM 64 rules, namely that for simplicity a DeMux stage is not shown

Art Unit: 3737

beyond the A/D devices in Figs. 6-7, and in Fig. 8 de-muxing is effected within the ultrasound processor's host PC 50 receiving output line 66.. Finally, it is possible that the conversion of sample-to-byte is embraced by definition as a MUX or DEMUX function, see Brodsky et al (US6669633) col. 21 lines 49-55 for a general example of such, however this is problematic as a DEMUX becomes that which converts bytes back to samples.

This issue carries forward into the rejections as the disclosure adequacy rejection of claims 6 and 9 below as well as in the application of Van Stralen et al (US2002/0167971) and Pflugrath et al (US6102863).

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 6 and 9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It would appear as an extension of the above discussion that auxiliary circuitry or additional material is required in the specification to enable the artisan to use an A/D converter as a form of de-multiplexer in the fashion being claimed.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5 and 8 are rejected under 35 U.S.C. 112, second paragraph, as failing to claim the disclosed invention. The specification page 7 lines 18-20 and line 26 – page 8 line 17 makes clear that although the elements can be configured using the same circuit blocks, 70 is a multiplexer and 76 a de-multiplexer. Hence the claiming of first and second multiplexers renders the claim indefinite wrt the disclosed invention.

***Claim Rejections - 35 USC § 102***

(Parenthesized claim numbers are used to associate rejected claims with the corresponding reasoning sentences.)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Dolazza et al (US5905692, of record) or Lipschutz (US5469851). The communication link called for in the base claim does not limit to a cable or wireless or to any relationship to the housing of a scanhead or the case of an ultrasound processing system.

Art Unit: 3737

Dolazza et al is effectively an improvement patent in relation to Lipschutz, both pertain to using Multiplex/de-multiplex stages connected by circuit paths to simplify the architecture of a parallel ultrasound beamformer system for image processing and display; Lipschutz de-muxes to reconstitute the individual ones of parallel beamformed echo lines; Dolazza et al reconstitutes within single such line, in either case for forwarding to the processor for display. (Claims 1-3).

Claims 1-3, 14-15, 18-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Breimesser et al (US5622177). Breimesser et al teaches a scanning method and attendant structure for a scanhead or probe 2 with plural transducers Emn, a transducer signal combining multiplexer 22 located in the scanhead 2, a wire or signal line path communications link L1..Lk connecting to a signal separating de-multiplexer 42 in the ultrasound base unit 4, the demux 42 separating the transducer signals for coupling to the signal processor.(Claims 1 – 3, 18-19). Signal combining and separating is practiced as a technique in order to transfer the signals from scanhead 2 to the ultrasound image processor over discrete signal lines (claims 14-15)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-5, 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al in view of Pridham et al (US4170766). The former is applied as in claim 1. Whereas the system is decidedly clocked, clocking is not explicitly shown for the MUX 22 and DEMUX 42. It would have been obvious in view of Pridham et al which teaches a sonar system subject to the same problem of cable weight to provide Mux and de-mux clocking 46 and 58 respectively in order to synchronize the clocking of transmission and reception in Breimesser with the moving forward of the resulting echo data. (Claim 4)..The second multiplexer is understood to refer to a de-multiplexer as in the Pridham et al face figure, see '112 2d rejection supra. (Claim 5). The use of a sample and hold stage in association with either or both of the MUX or DEMUX such as 38 and 62 would have been obvious in Breimesser since this allows for buffering of data concurrent with switching operations to forward it through the comm. Link. (Claim 7) Claim 8 then adds features as discussed re claim 5.

Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al in view of Pridham et al as applied to claims 4 and 7 above, and further in view of Van Stralen et al (US2002/0167971) or Pflugrath et al (US6102863). It would have been obvious in view of Van Stralen et al whose A/D converter 160 cooperates with DeMux 140 to practice time division multiplexing of ultrasound image data using the A/D device in cooperation with the De-Mux portion. Alternatively, if 'combining/separating' be more broadly interpreted regarding scope, it would have been obvious in view of Pflugrath et al elements 418 of Fig. 5 feeding forward to A/D stage in quantizers 31 of Fig. 3, that a partial reduced communication link between the

Art Unit: 3737

scanhead array and the beamformer portion may be had using subarray combining in a multiplexer and bit quantization separation at A/D 310 into parallel output 9 for providance as digital output.

Claims 10-11, 13, 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al as applied to claim 1 above, and further in view of Van Stralen et al (US6506160). Breimesser et al entertains frequency multiplexing by spectral nesting as an equivalent lead number reducing technique, see col. 5 lines 15-24. It would therefore have been obvious in view of Van Stralen to apply (SSB/DSB-SC) modulation in different frequency bands with summation of the component amplitude modulated signals before transfer onto the communications link, see col. 4 line 39 – col. 5 line 32. (Claims 10, 25).. Ring demodulation is used to reconstruct the original transducer element signals into channels 82 for beamformation. (claims 11,27). Frequency modulation and demodulation occur using local oscillators and filters respectively. (claim 13). The ring demodulation reconstructs the carrier frequencies, see col. 6 lines 45-55. (claim 26).

Claims 12 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al in view of Van Stralen et al as applied to claim 11 above, and further in view of Patterson (US4187493). Patterson is directed to an analogous technical problem, see col. 1-2 bridging, and solves by frequency division multiplexing of transducer outputs for communication link transmission to the central data collection point, where amplitude modulation is used in the frequency multiplexing and amplitude de-modulation in the de-multiplexing, see col. 3 lines 60-68 and col. 4 lines 42 – 45.



Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al as applied to claim 14 above, and further in view of Sumino (US4519250). It would have been obvious in view of the latter col. 2 lines 59-60 to couple scanhead and processor via optical fiber link since Sumino evidences that this is a suitable communications link medium for use with MUX/DEMUX elements 15, 24 for reduction of communication channel numbers.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al as applied to claim 14 above, and further in view of Brodsky et al (US6669633) which evidences via Fig. 11 and col. 28 lines 18 – 30 that it would have been obvious to use a wireless RF link as a communication link between portions of an ultrasound system since this maximizes flexibility of in-hospital use.

Claims 20 – 22, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al as applied to claim 14 above, and further in view of Pridham et al which teaches sequential clocked sampling via 38 cycling as a step in time multiplexing assemblage for transmission over the communications link. Data entering the S/H portions would do so simultaneously since this preliminary step is independent of the multiplex sampling of the held signals.(claims 20-22). Synchronization across the communications link is taught in Pridham et al via concurrent transmission of synch code, see 48, 60 therein (claim 24).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Breimesser et al as applied to claim 18 above, and further in view of Van Stralen (US2002..) or Pflugrath et al which teach that A/D digital quantification may occur after

Art Unit: 3737

reduced-lead transmission across the communication link and/or associated with deMUX signal reconstruction en route to the ultrasound processor.

The technology of the Teratech Corp. (assignee) namely Brodsky et al (US6669633) and Chiang et al (US2003/0073894) was considered insofar as the Brodsky et al chipset technology col. 11 lines 17-35 and col. 21 lines 49-55 might pertain to operations across communications link 40 potentially involving routine multiplex/de-multiplex stages as shown generally in Smyers et al (US6233637) since the IEEE 1394 link for example is only six-wire, and insofar as Chiang et al near contemporary to this application's filing teaches an advanced multi-media frequency multiplexing/de-multiplexing in paras [246]-[251] considered with paras [233] – [242] regarding Figs. 17 relating to communication links 40 from the scanhead. These links with respect to the para descriptions pertain to video data and/or post-beamformed data for which there may be bit-word or other stream multiplexing/de-multiplexing but evidence no reason to separate signals still associated with transducer elements across such links. Freiburger et al (US6475146) in col. 6 lines 49-65 also pertains to such wireless or IEEE 1394 connection.

Kitney et al (US5081993) is cited as of interest for time MUX/DEMUX portion 5 associated with the catheter scanhead for minimizing the number of required signal leads through the catheter.

Art Unit: 3737


Marquardt (US4041442) is cited as of interest for showing the relationship of MUX elements 30, 40 to digitization 62 for cable transmission with subsequent serial to parallel conversion 76.

Pflugrath et al (US6102863) was additionally reviewed in light of its teaching of MUX-DE-MUX switching (generalized as 18 in Fig. 3 and comprising elements 408, 410, 412, 418 in fig. 5) and the announced cable bundle size reduction purposes of its col. 1 bottom passage, weighed against the interpretation that applicants base claim 1 "communication link" need not be outside the scanhead or necessarily be a cable or the language pertain to activities on the direct ports of a cable. However the MUX-DEMUX or combiner-separator elements serve therein as routing architecture akin roughly to elements T-106, R-108 of Fig. 2a of Cole et al (US5617862, of record) and do not act together to combine-separate along a communications link path. Accordingly the relevance is no more particularized than applicants' prior art admission, specification pages 3-4. Pflugrath et al finds its way into the claim rejections only insofar as applicants have appeared to have broadened the definition of a de-multiplexer, vide supra.

Any inquiry concerning this communication should be directed to Francis J. Jaworski . at telephone number 703-308-3061.

FJJ:fjj

2-6-04



Francis J. Jaworski  
Primary Examiner